Amendments to the Claims:

The listing of Claims will replace all prior versions and listings of the Claims in the application:

In the claims:

1. (Original) An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

an enclosure providing a window operable to permit the passage of said power line therethrough;

an active current transformer set within said enclosure and operative to produce a scaled version of said current;

an amplifier coupled with said active current transformer and operative to reduce the phase shift and ratio error between said current and said scaled version of said current;

a powering current transformer set within said enclosure and operative to receive power from said power line on a primary winding and deliver power on a secondary winding;

power supply circuitry set within said enclosure, said power supply circuitry powered through said secondary winding from said powering current transformer and operative to supply power to said amplifier; and

at least one of secondary leads and secondary terminals extending from said enclosure, coupled with said active current transformer and operative to deliver said scaled version of said current outside of said enclosure.

2. (Original) The apparatus of claim 1 further comprising a burden set within said enclosure and coupled across said at least one of secondary leads and secondary terminals.

3. (Original) The apparatus of claim 1, wherein said amplifier is configured so that the absolute value of said phase shift is below 0.05 degrees when said apparatus is operated over a dynamic range of 50 to 1 of said current to said scaled version of said current.

4. (Original) The apparatus of claim 1, wherein said amplifier is configured so that the ratio error is below 0.1% when said apparatus is operated over a dynamic range of 50 to 1 of said current to said scaled version of said current.

5. (Original) The apparatus of claim 1, wherein said amplifier is configured to generate a compensation current which zeros the flux in a sense coil within said active current transformer.

6. (Original) The apparatus of claim 5 further comprising:

a secondary coil within said active current transformer;

a current divider coupled to said secondary coil;

wherein said current divider is configured to feed a portion of said compensation current into said secondary coil.

7. (Original) The apparatus of claim 1, wherein said power supply circuitry comprises:

a shunt coupled with said secondary winding and operative to carry at least a portion of an output current of said secondary winding.

8. (Original) The apparatus of claim 7, wherein said power supply circuitry further comprises:

a regulator coupled with said shunt and operative to regulate the flow of current through said shunt.

9. (Original) The apparatus of claim 8, wherein said regulator comprises a shunt regulator and further comprising:

a microcontroller operative to sense a current in said secondary winding, and based on said current in said secondary winding, operate said shunt in a linear or switched regulation mode.

10. (Original) The apparatus of claim 8, wherein said regulator comprises a linear shunt regulator.

11. (Original) The apparatus of claim 8, wherein said regulator comprises a switching regulator.

12. (Original) The apparatus of claim 11, wherein said switching regulator comprises a microcontroller.

13. (Original) The apparatus of claim 1, further comprising a detector operative to detect when said amplifier is unable to reduce said phase shift and ratio error by an expected amount.

14. (Original) The apparatus of claim 13, further comprising an indicator operative to indicate said detection.

15. (Original) The apparatus of claim 1, wherein said power supply circuitry is operative to provide power to a device external to said apparatus.

16. (Original) The apparatus of claim 1, wherein said power supply circuitry comprises:

a bridge rectifier coupled with said secondary winding and operative to provide a rectified output current from an output current of said secondary winding;

a shunt coupled with said bridge rectifier and operative to selectively shunt current from said secondary winding;

an energy storage device operative to receive a portion of said rectified output current that is not shunted by said shunt;

a regulator operative to sense a voltage of said energy storage device and turn said shunt off when said voltage is below a first threshold and turn said shunt on when said voltage is above a second threshold.

17. (Original) The apparatus of claim 16, wherein said regulator comprises a comparator.

18. (Original) The apparatus of claim 16, wherein said regulator comprises a microcontroller.

19. (Original) The apparatus of claim 18, further comprising:

a sense current transformer coupled to said secondary winding, said sense current transformer operative to provide a signal to a second amplifier;

wherein an output of said second amplifier is coupled to an input of said microcontroller and said microcontroller is operative to sense zero crossings in said output and turn said shunt off near said zero crossings.

20. (Original) The apparatus of claim 18, wherein said voltage powers said microcontroller.

21. (Original) The apparatus of claim 16 wherein said shunt comprises a MOSFET.

22. (Original) The apparatus of claim 21 wherein a core of each of said active current transformer and said powering current transformer is split such that a conductor in said power line can be placed within said window without disconnecting said conductor from said power system.

23. (Original) The apparatus of claim 1 wherein a core of each of said active current transformer and said powering current transformer is split such that a conductor in said power line can be placed within said window without disconnecting said conductor from said power system.

24. (Original) The apparatus of claim 23 wherein said active current transformer comprises a sense core and a secondary core; said sense core mounted within a groove formed in said secondary core.

25. (Original) The apparatus of claim 1 wherein said active current transformer comprises a sense core and a secondary core; said sense core mounted within a groove formed in said secondary core.

26. (Original) The apparatus of claim 1 wherein said active current transformer comprises said powering current transformer.

27. (Original) The apparatus of claim 1, wherein said at least one of secondary leads and secondary terminals are configured for interconnection to an intelligent electronic device.

28. – 33. (Canceled)

34. (Currently Amended) An apparatus for sensing the current in a power line of a power system comprising:

a current sensor assembly configured to be mounted on said power line;

a first current transformer within said assembly configured to extract operating power for said assembly from said power line;

a current transducer within said assembly configured to sense current flow in said power line;

a transmitter within said assembly configured to transmit [[a]] at least one digital sample proportional to said current flow to a first receiver within an intelligent electronic device; and;

a second receiver within said assembly configured to receive a time reference, wherein said transmitter is further operative to transmit time information to said intelligent electronic device; said time information indicative of when said digital sample was taken.

35. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said current transducer is a current transformer.

36. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said current transducer is a Rogowski coil.

37. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said transmitter is configured to transmit data over fiber optic cabling and said first and second receivers are configured to receive data over said fiber optic cabling.

38. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said transmitter is configured to transmit data over a first wireless channel and said first and second receivers are configured to receive data over at least one of said first wireless channel and at least one second wireless channel.

39. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said current sensor comprises an active current transformer.

40. (Currently Amended) The ~~system~~ apparatus of claim 39 wherein said second receiver is operative to receive said time reference from at least one global positioning satellite.

41. (Currently Amended) The ~~system~~ apparatus of claim 40 wherein said second receiver is further operative to determine a location of said current sensor assembly using said at least one

global positioning satellite; and wherein said transmitter is operative to transmit said location to said first receiver.

42. (Currently Amended) The ~~system~~ apparatus of claim 39 wherein said second receiver is operative to receive said time information from a wireless telephone network.

43. (Currently Amended) The ~~system~~ apparatus of claim 42 wherein said second receiver is further operative to determine a location of said current sensor assembly using said wireless telephone network; and wherein said transmitter is operative to transmit said location to said first receiver.

44. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said second receiver is operative to receive said time information from at least one global positioning satellite.

45. (Currently Amended) The ~~system~~ apparatus of claim 44 wherein said second receiver is further operative to determine a location of said current sensor assembly using said at least one global positioning satellite; and wherein said transmitter is operative to transmit said location to said first receiver.

46. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said second receiver is operative to receive said time information from a wireless telephone network.

47. (Currently Amended) The ~~system~~ apparatus of claim 46 wherein said second receiver is further operative to determine a location of said current sensor assembly using said wireless telephone network; and wherein said transmitter is operative to transmit said location to said first receiver.

48. (Currently Amended) The ~~system~~ apparatus of claim 34 wherein said second receiver is operative to receive said time information from a very low frequency radio station.

49. (Original) An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

an enclosure providing a window operable to permit the passage of said power line therethrough;

an active current transformer set within said enclosure and operative to produce a scaled version of said current; said current containing frequency components substantially within a first range;

an amplifier coupled with said active current transformer and operative to reduce the phase shift and ratio error between said current and said scaled version of said current;

a powering current transformer set within said enclosure and operative to receive power from said power line on a primary winding and deliver power on a secondary winding;

at least one of secondary leads and secondary terminals extending from said enclosure, coupled with said active current transformer and operative to deliver said scaled version of said current outside of said enclosure; and

power supply circuitry set within said enclosure, said power supply circuitry operative to extract power flowing within a second range of frequencies through said at least one of secondary leads and secondary terminals, said power supply circuitry operative to supply power to said amplifier.

50. (Original) The apparatus of claim 49 wherein said first range is 4kHz and below and said second range is 400kHz and above.

51. (Original) The apparatus of claim 49 wherein said first range covers a frequency range at lower frequencies than said second range.

52. (Original) The apparatus of claim 49 wherein said at least one of secondary leads and secondary terminals are operative to deliver said scaled version of said current in the form of digital data.

53. (Original) The apparatus of claim 49 wherein said at least one of secondary leads and secondary terminals are operative to deliver said scaled version of said current in the form of a scaled current signal.

54. – 58. (Canceled)

59. (New) An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

an active current transformer that includes a secondary coil wound on a secondary core, wherein the secondary core is operable to be magnetized with a power line and the secondary coil is operable to supply a load;

a compensation circuit operable to compensate for magnetic losses in the secondary core;

a power supply circuit having a supply rail, wherein the power supply circuit is operable to regulate the supply rail in one of a switched regulation mode and linear regulation mode to supply power to the compensation circuit from the supply rail; and

a powering current transformer that includes a power coil wound on a power core, wherein the power core is operable to be magnetized with the power line and the supply rail is powered from the power coil.

60. (New) The apparatus of claim 59, further comprising a microprocessor and a regulator, wherein the microprocessor is operable to regulate voltage on the supply rail in the switched regulation mode and the regulator is operable to regulate voltage on the supply rail in the linear regulation mode.

61. (New) The apparatus of claim 59, wherein the power supply circuit comprises a shunt switch couple between a ground connection and the supply rail, the shunt switch selectable to be one of open and closed during the switched regulation mode, and the conductivity of the shunt switch operable to be dynamically modulated during the linear regulation mode.

62. (New) The apparatus of claim 59, wherein the power supply circuit comprises a first switch and a second switch coupled with the supply rail, the first switch selectively enabled to provide a conductive path to ground and the second switch selectively enabled to conduct when a voltage at the first switch is greater than a voltage of the supply rail.

63. (New) The apparatus of claim 59, wherein the power supply circuit comprises an energy storage device coupled with the supply rail, the energy storage device operable to selectively receive a charging current to maintain a determined voltage on the supply rail.

64. (New) The apparatus of claim 59, further comprising a microprocessor and a compensation overload detection circuit powered from the supply rail, wherein the compensation overload detection circuit is operable to provide the microprocessor an indication when the compensation circuit is no longer compensating for all of the magnetization losses in the secondary core.

65. (New) The apparatus of claim 59, wherein the active current transformer comprises a sense coil wound on a sense core, wherein the secondary coil is wound around both the secondary core and the sense core, and the sense core is magnetized by the power line and is operable to induce a sense current in the sense coil, and wherein the compensation circuit is operable to generate a compensation current to maintain the voltage across the sense coil at about zero volts.

66. (New) The apparatus of claim 65, further comprising a current divider coupled with the sense coil and the secondary coil, wherein the current divider is operable to balance the compensation current.

67. (New) The apparatus of claim 50, further comprising a current monitoring circuit that includes a secondary coil sensing current transformer coupled with the power coil, the current monitoring circuit operable to generate a voltage representative of the output current.

68. (New) The apparatus of claim 59, further comprising an auxiliary power terminal, wherein the supply rail is operable to supply power to the auxiliary power terminal for use external to the apparatus.

69. (New) An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

a power current transformer that includes a power coil wound around a power core, the power core operable to be magnetized by a power line to produce an output current from the power coil;

a power amplifier circuit that includes an energy storage device and a shunt switch coupled with the power coil;

wherein the shunt switch is selectively operable to shunt at least a portion of the output current to ground to maintain a determined voltage at the energy storage device; and

an active current transformer that includes a secondary coil wound on a secondary core, wherein the secondary coil is operable to supply a burden and the secondary core is operable to be magnetized with the power line.

70. (New) The apparatus of claim 69, further comprising a compensation circuit coupled with secondary coil and the energy storage device, wherein the compensation circuit is powered by the energy storage device and is operable to compensate for magnetic losses in the secondary core.

71. (New) The apparatus of claim 69, further comprising a bridge rectifier coupled between the power coil and the power amplifier circuit, the bridge rectifier operable to rectify the output current.

72. (New) The apparatus of claim 69, wherein the power amplifier circuit comprises a microprocessor and a linear regulator, the microprocessor operable to monitor the output current and to select between switch mode regulation of the energy storage device with the microprocessor and linear regulation of the energy storage device with the regulator as a function of the output current.

73. (New) The apparatus of claim 69, wherein the power amplifier circuit comprises a one way switch, the one way switch operable to conduct only when the voltage at the energy storage device is less than the voltage at the shunt switch.

74. (New) The apparatus of claim 69, further comprising a switched capacitor circuit coupled with the energy storage device, wherein the switched capacitor circuit is operable to generate a predetermined negative voltage on a negative rail and a predetermined positive voltage on a positive rail from the determined voltage of the energy storage device.

75. (New) The apparatus of claim 69, wherein the shunt switch comprises a semiconductor device and the energy storage device comprises a capacitor.

76. (New) The apparatus of claim 69, further comprising an auxiliary power terminal, wherein the energy storage device is operable to supply power to the auxiliary power terminal for use external to the apparatus.

77. (New) A method of sensing the current in a power line of a power system, the method comprising:

magnetizing a power core of a power current transformer with a power line to produce an output current;

generating a supply rail voltage with the output current;

selectively switching a shunt switch between an open position and a closed position to regulate the supply rail voltage when the output current is at or above a determined threshold, wherein the shunt switch is coupled between the output current and ground;

modulating the conductivity of the shunt switch to regulate the supply rail voltage when the output current is below the determined threshold;

magnetizing a secondary core of an active current transformer with the power line to supply a secondary current to a burden; and

compensating for magnetization losses in the secondary core with a compensation circuit that is powered with the supply rail voltage.

78. (New) The method of claim 77, wherein selectively switching the shunt switch, comprises selectively enabling a one way switch to conduct at least a portion of the output current when the supply rail voltage is less than the voltage at the shunt switch and selectively enabling the one way switch to be non-conducting when the supply rail voltage is greater than the voltage at the shunt switch.

79. (New) The method of claim 77, wherein the determined threshold is determined from a current threshold minus a hysteresis constant of the power current transformer.

80. (New) The method of claim 77, further comprising monitoring a controller voltage developed on a controller supply rail from the supply rail voltage, and stopping execution of instructions by a microprocessor powered with the controller voltage when the controller voltage is below a determined threshold.

81. (New) The method of claim 77, further comprising dividing a compensation current generated by the compensation circuit between the secondary current and a divider resistor.

82. (New) The method of claim 77, further comprising monitoring the compensation circuit to detect when compensation for magnetization losses is insufficient.

83. (New) The method of claim 82, further comprising generating an indication receivable by a user when said compensation for magnetization loses is insufficient.

84. (New) The method of claim 77, further comprising making said supply rail voltage available to power an external device.